Storage and system solutions

Developments in system technology are leading away from solely feeding solar energy into the grid, as in many countries it is becoming increasingly less financially attractive. As remuneration drops and grid electricity prices rise, self-sufficiency is becoming the alternative financing model for solar power systems. The combination of intelligent control systems and battery storage is regarded as the future of photovoltaics by a large number of providers.

One of these companies is Voltwerk Electronics GmbH from Hamburg, Germany. At the Intersolar, the company will be presenting the VS Hybrid system. It combines a 5 kW transformerless inverter with a lithium-ion battery and a management system. The standard battery capacity is 8.8 kWh. However, the system cabinet is designed for 13.2 kWh, so that it is possible to increase the capacity of the battery. The system provides operators with a largely self-sufficient and decentralised power supply. Taking electricity from the grid will only be necessary, if the modules and the battery cannot provide enough energy. In the event of a grid outage, however, the system will continue to run autonomously, Voltwerk Electronics highlights. According to Voltwerk’s estimations, the coincidence in times of photovoltaic electricity generation and its usage in a 4-person household can be increased to approximately 70 %. For the summer months, the manufacturer predicts complete independence from the public electricity grid. The integrated monitoring system makes the relevant data available in real time, i.e. household energy consumption as well as status and yield from the photovoltaic system and battery. The energy flows and the function of the components is regulated and controlled by the system management unit.

Booth: C4.350

The German company Solutronic AG describes its SOL Energymanager as a “small home power station.” It will be presented at the exhibition as a complete system with PV inverter, battery inverter, energy management system and Li-ion battery and is set to come on the market this year. As Solutronic emphasises, it is a compact system that forms one unit and can be used immediately after installation. It is connected to the existing electricity system of the building by means of a meter box integrated into the cabinet. It is said to manage in-house consumption fully automatically without the need for the operator to carry out any manual adjustments. Using the touch display (5.7 inches), the operator controls all components and functions and can view the operating data regarding the solar power output, battery and grid feed-in. The own-consumption system can also be used without a battery, which can be retro-fitted as an additional module. If the customer is not at home, he can remotely control the system using a smart phone. Solutronic states that all data can be accessed via special software and applications.

Booth: C4.340

Solon Energy GmbH has also focused on a combination of photovoltaics and battery storage and aspires...
to cover 70 % of demand with solar power. However, Solon SOLiLiberty relies on the cheaper lead battery cells for the Solon SOLiLiberty energy storage system. Using 24 of these cells, the storage system achieves a rated capacity of 24 kWh. Solon considers the storage solution to be “low maintenance, reliable, robust and good value for money.”

The energy is managed according to the usual principle: domestic use and the battery have priority over the grid feed-in and grid energy is only called upon, if the solar potential has been exploited. The company emphasised that a protection against damaging deep discharge is supposed to guarantee a long battery life of approximately 10 years. Solon also offers the storage system as an upgrade to existing PV systems.

Booth: A4.380

The Japanese technology concern Kyocera premiers its “all-in-one” concept at Intersolar in Munich. In this case, a small-sized fuel cell for combined heat and power generation is added to a photovoltaic installation, Li-ion battery and an energy management system. The idea is to store the solar energy that is produced on the roof and to directly consume it when required. The additionally installed fuel cell generates electricity and heat from natural gas. The energy management system controls the energy flows between the generators, consumers and the public grid. The storage provided by Kyocera has a capacity of 7.1 kWh and weighs 200 kg. It is fed from the PV installation and the fuel cell, which leads to a high level of self-sufficiency. Kyocera says it developed the fuel cell in cooperation with the companies Osaka Gas, Aisin, Chofu and Toyota. At the moment, Kyocera is working on tailoring the system to the requirements of the European market.

Booth: A3.240

Azur Solar from Leutkirch, Germany, is also showcasing an independent energy system. Azur Independa is designed for people wanting to gain independence from electricity prices. As Azur emphasizes, every kilowatt hour produced by the consumer is cheaper in comparison to the energy purchase price from the public grid. The system is designed to connect easily to the existing household power supply and it can be tailored to the customer’s individual requirements. According to the company consumers can cover more than 80 % of their power supply with self-produced solar energy.

Booth: B3.311

The German battery producer ads-tec focuses on Li-ion batteries. The company develops and produces modular and scalable high-performance energy storage systems for kWh and MWh usage. The energy storage systems comprise of the Battery Management System (BMS), temperature control, mechanics and housing and also cover further requirements. For stationary energy storage, the expansion to large clusters and container solutions is also possible and is offered as a complete system. The product portfolio being presented in Munich contains the storage rack battery in 19” rack format, the storage block battery in a compact format, stable housing and all the

Two types of energy generation under one roof: Kyocera combines PV with a gas operated fuel cell. Graphic: Kyocera

Azur Solar

What really counts is this.

Only the kilowatt hours produced on the roof by the solar installation count for your customer. As is so often the case, the right ratio is what matters.
StoraXe container systems. Beyond that the inhouse developed Remote Service Cloud Big-LinX makes it possible to connect the energy storage systems to a central management cloud. Ads-tec is a founding board member of KliB e.V, the competence network for Li-ion batteries, and is also part of many excellence groups supported by the German government for the development of new storage systems.

Booth: B3.270

From modules to a PV system: in Munich, Siliken is introducing its EnergyBox photovoltaic kit, a tailor-made installation kit for all types of residential and industrial rooftops. According to Siliken, it provides installers with a choice of over one hundred structure solutions that make the kit suitable for any type of residential or industrial rooftop. As the kit is scalable there is no restriction to the rooftop size. The system contains all components that are required for the installation, including modules, structure, suitable inverters as well as electrical components. Siliken specifically selects all elements of the system and promises an optimized performance. Last year, Siliken developed an online configuration tool allowing installers to design and optimize rooftop installations by using the energyBox kit. This application is accessible from the Siliken web site. In addition, the company offers free technical consulting services for installers in order to personalize the installations using the energyBox and to make them as flexible as possible.

Booth: B3.186

Zentralsolar Deutschland presents a small independent complete system in form of the Zentralsolist (central soloist) product, which is a play on the company’s German name. The system is intended for off-grid energy provision for camping or in summer houses. It could also be used in countries that do not have blanket energy supply. “Zentralsolist” is a modular island system. It is important for Zentralsolar that untrained persons can also assemble and commission the system without external tools. The module is placed on the ground using a stand, therefore roof structures do not need to be considered. The modules are orientated using the compass built into the module stand. In addition, the module inclination can be easily adjusted (± 30°). The brackets for the module can also be used as handles during transport. Zentralsolar houses the complete electronics and an accumulator in the “Technikbox”.

Booth B4.370

Ralf Ossenbrink

Manufacturing and connection technology

A world standard from the South German region of Franconia: Reis Robotics operate over 120 facilities worldwide. The standards they developed in recent years are now established on all PV markets. The systems delivered to date account for some 6 GW of electric power generated by the manufactured PV modules. Reis Robotics view themselves as system suppliers. Accordingly, they don’t only supply individual manufacturing cells or automation components on demand, they also hand over complete turnkey production lines to the operator. Reis Robotics systems are used not only in silicon module manufacture but also in thin-film and solar thermal applications. The spectrum ranges from partially manual and semi-automatic systems to fully automated production facilities. Per production line, capacities ranging from 10 MW to 600 MW can be realised.

Booth: A6.260

P.Energy presents the new Tabber and Stringer TS1200GOLD. P.Energy TS1200GOLD is a full automatic tabber and stringer with an actual throughput of 1,200 cells per hour with a cell breakage rate of less than 0.3 %, according to the company. The iron welded structure has been designed for easy access, offering the operator a wide working space. The double-track unloading belt ensures reduced installation space requirements and a direct connection to the robotised layup station P.Energy LO072AR.
The main features are: it works with all standard cells and cell thicknesses ranging from 160 µm to 300 µm. A visual cell quality system and an optical centring system are integrated. A simple and wide 15” touch screen monitor with fingertip access permits the control of all process parameters.

**Booth: A6.518**

**Ducatt**, a Belgian company fully dedicated to producing solar glass, is pushing solar glass to its limits, aiming for a transparency up to 95 % and a thickness down to 2 mm. The purpose is to enable lightweight, durable photovoltaic modules with the highest ratio of power output per cost (W/m²). Ducatt is demonstrating a full-size frameless 2+2 mm glass-glass PV module. The company, a spin-off of glass producer Emgo based in Belgium, started producing solar glass in December 2011. Ducatt is an abbreviation of its mission to produce Dedicated Ultra-Clear Anti-reflective, Thin and Toughened solar glass. To this end, Ducatt built a tailor-made production line in 2011 and is able to thermally toughen glass of just 2 mm thickness with a flexural strength of 120 MPa, using a state-of-the-art tempering furnace developed by its strategic partner LiSEC. Ducatt produces ultra-clear textured solar glass throughout the year. The glass-glass module demonstrated at Intersolar incorporates new encapsulant foils developed by NovoPolymers, a Belgian company serving the solar industry, with whom it shares a booth at the Intersolar.

**Booth: A6.515**

**NovoPolymers** is a Belgian company specialised in the design and conversion of polymer formulations into photovoltaic encapsulant sheets. Recently, NovoPolymers has developed a new range of encapsulants for photovoltaic modules offering cost optimisation and further benefits such as a significant higher power output and an increased durability, as the company explains. The new products have either already been launched (NovoVellum MF01, NovoVellum FW01) or are currently under scrutiny in IEC certification tests with preferred partners.

**Booth: A6.416**

**TS1200Gold** is a fully automatic tabber and stringer with an actual throughput of 1,200 cells per hour.

**Photo: P.Energy**

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**So think twice before you make your choice.**

In a stable and successful relationship both sides complement each other. Sovello solar modules are perfect for your customers: they are Made in Germany, meeting the highest standards of reliability and quality with industry-leading kWh-to-kWp ratio for optimum yields.

For more information about the benefits of Sovello modules visit www.sovello.com
ISRA Solar Vision inspects cell edges: when manufacturing Grade A quality solar cells, it is essential to immediately identify paste stains and contaminations on the surface directly after printing and before firing. ISRA Solar Vision, providers of advanced optical inspection solutions, now offers an inspection system for paste stains on cell edges (the bevel). It contributes to the early detection of possible short circuits which otherwise would only be found in the flashing process. This allows for the repair of the affected cell and the prevention of secondary faults that are otherwise only detected in the cell tester. The inspection with SOLARSCAN-Bevel at this point ensures Grade A quality at least for the next 400 cells. The return-on-investment is said to be less than four months.

Booth: A6.575

Automatic inspection of the solar cell edges after printing allows for the repair of short circuits and helps eliminate waste.

Photo: ISRA

Connection and disconnection

Among the exhibits of Schaltbau GmbH are DC power contactors, snap-action switches with forced circuit breakers and plug connectors. The contactors disconnect the DC side of the solar array from the inverter as primary or pre-charge contactors. Voltages involved are around 1,000 to 3,000 V with an amperage ranging from 50 to 1,000 A. According to the company, the CU series is the first solar contactor to meet the EN 60947-3 standard (Table 9 “Switch Disconnectors with Fuses”) and it is also UL-listed. Its mechanical life is two million switching operations; the electrical life over 10,000 switching operations depending on the load. CU contactors from Schaltbau switch voltages up to 1.5 or 3 kV and are suitable for currents up to 1,000 A. The small type C 294 & 295 solar contactors are used in various pre-charge applications for lower voltages (up to 1 kV). The LV series charge plug connectors are used in battery storage systems. The snap-action switches with forced circuit breakers are used as limit switches in the drives of PV tracking system actuators and as auxiliary switches in CU series solar contactors.

Booth: C4.451

Phoenix Contact is expanding its Sunclix photovoltaic connector line by adding DC connection and disconnection.
plug connectors for 16 mm² cables. These one-piece plugs feature a patented spring connection used to connect DC cables easily and quickly without special tools. According to Phoenix Contact, this makes it possible to connect photovoltaic cables with conductor cross-sections ranging from 2.5 mm² to 16 mm² using just two sizes. Rated voltages up to 1,500 V and currents up to 65 A further facilitate the combination of multiple strings into a single string. A screwdriver is required to open the reusable connectors, thus preventing unintentional disconnection. The connectors from Phoenix Contact, which conform to the IP 68 protection class and DIN EN 50521 standard requirements, further enhance the company’s innovative product portfolio for photovoltaic systems.

**Booth: B6.450**

The Q Fire Switch from Q3 Energielektronik is a new system – patent pending – which allows for the controlled disconnection of PV modules, thus promising maximum safety. In case of fire or any incident during maintenance work or cleaning, a PV plant needs an effective and secure way to switch off the modules. The installation of a Q Fire Switch offers a way to switch off the PV modules. It ensures safe and secure handling for people working near the modules. After disconnecting the supply voltage, all modules are connected to the ground potential.

**Booth: C4.411**

Huber+Suhner is presenting two new junction boxes. The Radox Solar HS3 junction box is one of two new cost-optimised connection systems from the Swiss manufacturers. With 150 mm x 75 mm, it is significantly smaller than the previous models HA3 and RH3. It is designed for high system voltages of 1,500 V/1,000 V and already meets the latest standards EN 50548:2011 and UL3730. Furthermore, the HS3 will be available with several connection designs.

The new modular connection socket Radox Solar HMO aims to convince: system voltages of 1,500/1,000 V, multiple connection options and an optimised design for automated processes. The box consists of a basic box with an integrated interface that can be fitted or retrofitted with an optional blue box. The blue box will look different depending on the integrated smart electronics. Both boxes will be ready for production as of Intersolar 2012. **Booth: B6.370**

The photovoltaic plug connector MC4-PLUS from Multi-Contact has recently acquired the UL certification for 1,000 V DC – this is, according to the Swiss manufacturers Multi-Contact, the world’s first plug connector with the dual certification of 1,500 V DC TÜV and 1,000V DC UL. MC4PLUS is compatible with the MC4 plug connector system. The company has another successfully passed test to show: the connection box Westlake from Multi-Contact successfully passed the salt spray test for severity level V as per DIN EN 60068-2-52:1996. Westlake is TÜV and UL certified. The flat design of the box (120 x 116 x 23 mm) allows for installation directly underneath the module frame construction. According to the company, this saves time during the installation process as bending the ribbon cables is no longer required. It is connected by soldering or, optionally, with a terminal. Westlake can be fitted with the connectors MC3, MC4 and MC4PLUS. **Booth: B6.350**

QC Solar operates two factories located in Suzhou City and Huai’an City, China. QC Solar are certified to ISO9001, ISO14001 and OHSAS18001 and their products have been approved both by TÜV and UL. The company is engaged in the design and manufacture of products related to all types of PV applications. QC Solar cooperate with Xi’an Jiaotong-Liverpool University in their efforts to research solar control systems and develop products and their applications. The product portfolio includes solar junction boxes, off-grid solar charge controllers, smart PV power return system, solar cables, connectors, branched cables, multi-function terminals and controllers. According to the company, the products are suitable for long-term application in harsh outdoor environments. **Booth: B6.455**

Italy-based Compel Electronics presents the CSP-2 valve connector with an integrated pressure balance (ventilation) system. It is suitable for application in inverters and string boxes and it reduces maintenance costs and the number of warranty claims. This product was designed in a joint effort between Bimed and Compel, both leaders in their respective markets for cable glands and photovoltaic interconnection systems, as they stated. The aim of this partnership is to design and develop special connectors for the PV market. **Booth: B6.256**

Jörn Iken